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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the detector of the envelope of the high frequency signal used in a mobile phone etc.
[0002]
[Description of the Prior Art] In digital cellular phon systems, such as a cellular phone and a land mobile radiotelephone, generally transmission and reception are made into the same frequency, and the TDMA method which performs the so-called ping-pong transmission is adopted. That is, as shown, for example in drawing 5 , one channel (frequency) is divided into the repeat of the transmitting time slot T, the receiving time slot R, and the idle time slot I in time. And a mobile station carries out transmission to a base station to Slot T, and carries out reception from a base station to Slot R.
[0003] Furthermore, it enables it to control thru/or change a base station in the transmitting output of a mobile station at this time. This is for increasing the number of those who can use a system for coincidence also in the service area (cel) of other base stations as can use the same frequency by holding down to the minimum value for which a base station needs the transmitting output of a mobile station.
[0004] And in order to enable it to change a transmitting output such, the sending circuit of a mobile station is constituted as shown in drawing 6 . That is, in drawing 6 , that sending circuit is shown, the sound signal from a telephone transmitter 11 is supplied to the digital processing circuit 12, and it is a predetermined format, and 10 is changed into the intermittent digital signal of every transmitting time slot T, and is changed into the sending signal S13 by which this digital signal was supplied to the modulation circuit 13, and quadrature modulation was carried out. And this sending signal S13 is supplied to the transceiver antenna 19 through the signal line of the gain control circuit 14 -> power amplification 15 -> microstrip line 16 -> isolator 17 -> antenna common machine 18, and is transmitted to a base station. In addition, the frequency band used for transmission is 940-960MHz.
[0005] Moreover, 20 shows the system controller constituted with the microcomputer etc. And a predetermined command signal or data is accessed between this system component 20 and base station through a sending circuit 10 and a receiving circuit (not shown). Furthermore, according to the command signal or data from a base station, a sending circuit 10, a receiving circuit, etc. are controlled by the system component 20.
[0006] And the APC circuit where 30 controls a transmitting output is shown. That is, while the data D31 which specify a transmitting output are loaded to latch 31 from a system component 20, this latch's 31 data D31 are supplied to D/A converter 32, and are changed into analog voltage V32, and this electrical potential difference V32 is supplied to the electrical-potential-difference comparator circuit 33 as reference voltage. Moreover, a part of sending signal S13 which leads this is taken out from a microstrip line 16, the electrical potential difference V34 which this taken-out sending signal S13 is supplied to the envelope detector 34 which has diode 341, and shows the envelope of a sending signal S13 is taken out, and this electrical potential difference V34 is supplied to a comparator circuit 33 as a comparison input. And in a comparator circuit 33, the electrical-potential-difference comparison of the

electrical potential difference V34 is carried out with reference voltage V32, the comparison output is supplied to the gain control circuit 14 as the control voltage through the drive circuit 35 which has a predetermined integral property, and the gain of the gain control circuit 14 is controlled to be set to V34=V32.
[0007] Therefore, since it is controlled to become equal to the level of an electrical potential difference V32, the level (= V34) of a sending signal S13 can control the level of a sending signal S13, if the value of data D31 is controlled by the system component 20. Therefore, a base station can control the transmitting output of this mobile station.
[0008] In this way, in the sending circuit of drawing 6 , since it can hold down to the minimum value for which a base station needs the transmitting output of a mobile station, the frequency same also in the service area of other base stations can be used, and the subscription capacity of a system can be increased. Furthermore, in the gain control circuit 14, since the transmitting output is controlled by controlling the level of a sending signal S13, power efficiency can be raised.
[0009] However, generally there is the about 2mV [/degree C] temperature characteristic in diode. And in the sending circuit 10 of drawing 6 , the electrical potential difference V34 which detects the sending signal S13 from Rhine 16 with the diode 341 of a detector circuit 34, and shows the envelope of a sending signal S13 has been obtained. Therefore, the level of the electrical potential difference V34 will change with temperature.
[0010] And since the temperature change which diode 341 receives since a body part including the sending circuit 10 of drawing 6 is arranged in the trunk room of an automobile when a mobile station is a land mobile radiotelephone becomes remarkable magnitude, therefore serves as magnitude also with the remarkable temperature change of the detection output voltage V34, a transmitting output will be sharply changed as a result . In this case, if level of the sending signal S13 supplied to a detector circuit 34 is enlarged, since that detection output voltage V34 will become large, the rate for the temperature change contained in that electrical potential difference V34 becomes small, and can make a changed part of a transmitting output small. However, supplying a sending signal S13 to a detector circuit 34 from Rhine 16 sees from the sending signal S13 actually transmitted from an antenna 16, it is a loss, and the loss will become large if level of the sending signal S13 supplied to a detector circuit 34 is enlarged.
[0011] Then, in the circuit of drawing 6 , diode 342 is formed as a temperature-compensation circuit, and a part for the temperature change of the detection output voltage V34 of diode 341 is canceled by part for the temperature change of the terminal voltage of this diode 342.
Bibliography: The American patent No. 4523155 specification [0012]
[Problem(s) to be Solved by the Invention] However, it is required to maintain the diode 341 for detection and the diode 342 for temperature compensation at the same temperature, and it is necessary to approach mutually and to arrange both the diodes 341 and 342 by the temperature-compensation approach as shown in drawing 6 , for this reason.
[0013] Moreover, since the bias currents which flow to diodes 341 and 342 differ, the forward voltage drops of both the diodes 341 and 342 will differ mutually, and offset voltage will be contained in the detection output voltage V34 of a detector circuit 34.
[0014] When this invention detects the envelope of the high frequency signal acquired intermittently in view of the above points, that detection electrical potential difference tends to offer a stable envelope detector to a temperature change.
[0015]
[Means for Solving the Problem] For this reason, in this invention, if the reference mark of each part is made to correspond to the below-mentioned example The detector circuit 35 which carries out the envelope detector of the high frequency signal S13 acquired intermittently, The sampling hold circuit 37 which samples and holds the detection output V35 of a detector circuit 35 when the RF signal S13 is not acquired, Subtraction with the detection output V35 of a detector circuit 35 and the output V37 of the sampling hold circuit 37 is performed, and the subtractor circuit 36 which outputs the electrical potential difference V13 which shows the envelope of the high frequency signal S13 is formed.
[0016]

[Function] The output V37 of the sampling hold circuit 37 corresponds to the offset voltage of the detection output V35 of a detector circuit 35, this offset voltage V35 is subtracted from the detection output V35 of a detector circuit 35, and the temperature-independent envelope detection electrical potential difference V13 is taken out.
[0017]
[Example] In drawing 1 , while the envelope detector circuit 41 is constituted by diode 411, predetermined direct current voltage is supplied to a terminal 412, and a predetermined bias current is passed by diode 411 through current Rhine of the resistor 413 -> resistor 414 -> diode 411 -> resistor 415. Therefore, the detection electrical potential difference V41 as shown in drawing 2 A is taken out from a detector circuit 41.
[0018] That is, since the sending signal S13 is outputted to the transmitting time slot T, the electrical potential difference V13 which changes corresponding to the envelope wave of a sending signal S13 is obtained. Moreover, when a bias current flows to a resistor 415, offset voltage V415 is produced to a resistor 415. And the addition electrical potential difference (V13+V415) of the envelope wave electrical potential difference V13 and offset voltage V415 is outputted as a detection electrical potential difference V41.
[0019] On the other hand, since the sending signal S13 is not outputted, offset voltage V415 is outputted to the receiving time slot R and the idle time slot I as a detection electrical potential difference V41. In addition, although the envelope wave electrical potential difference V13 does not change with temperature, the level of offset voltage V415 changes with temperature.
[0020] And this detection electrical potential difference V41 is supplied to a subtractor circuit 42. Moreover, while being supplied to the sampling hold circuit 43, this detection electrical potential difference V41 As shown, for example in drawing 2 B, the pulse P43 located at the time in front of the transmitting time slot T is taken out from a system component 20. This pulse P43 is supplied to the sampling hold circuit 43 as a control signal of that sampling hold. From the sampling hold circuit 43 As shown in drawing 2 C, the direct current voltage V43 (V43=V415) of level equal to the offset voltage V415 located at the time in front of the transmitting time slot T is taken out.
[0021] And this direct current voltage V43 is supplied to a subtractor circuit 42, and an electrical potential difference V43 is subtracted from the detection electrical potential difference V41, therefore as shown for example, in drawing 2 D, the envelope wave electrical potential difference V13 V13 of a sending signal S13, i.e., the detection electrical potential difference of an envelope, is taken out from a subtractor circuit 42. And this electrical potential difference V13 is supplied to a comparator circuit 33, and the level of a sending signal S13 is henceforth controlled in the gain control circuit 14 as mentioned above.
[0022] In this way, although the envelope detection electrical potential difference V13 of a sending signal S13 can be obtained, since the offset voltage V415 of that detection electrical potential difference V41 is canceled with the offset voltage V43 taken out by the sampling hold circuit 43 even if the diode 411 for detection is influenced of temperature in this case according to the circuit of drawing 1 , the envelope detection electrical potential difference V13 which does not change with temperature can be obtained.
[0023] Moreover, since the envelope detection electrical potential difference V13 is not influenced of temperature, it can also use the trunk room of the large automobile of a temperature change. Furthermore, since temperature compensation will be carried out for every time in front of the transmitting time slot T, a rapid temperature change can also be followed and the envelope detection electrical potential difference V13 can be obtained to stability. And since offset voltage is not contained in the envelope detection electrical potential difference V13, the envelope is correctly detectable even if a sending signal S13 is minute level.
[0024] In the example shown in drawing 3 , it is the case where digital processing is made to perform the sampling hold of the detection electrical potential difference V41. That is, the detection electrical potential difference V41 from a detector circuit 41 is supplied to A/D converter 44, and is changed into digital data D44, and this data D44 is supplied to a subtractor circuit 45. Moreover, data D44 are

supplied to a gate circuit 46, the data D415 in which the data D44 V415 in front of the transmitting time slot T, i.e., offset voltage, are shown by the pulse P43 are taken out, while this data D415 is loaded to memory 47, from the period of the continuing transmitting time slot T, and memory 47, it reads repeatedly, it is carried out, and a subtractor circuit 45 is supplied.
[0025] And in a subtractor circuit 45, data D415 are subtracted from data D44, the data D13 corresponding to the envelope detection electrical potential difference V13 are taken out, this data D13 is supplied to D/A converter 48, and the envelope detection electrical potential difference V13 is taken out. In addition, in this example, it can also subtract instead of a subtractor circuit 45 using CPU and software.
[0026] In the example shown in drawing 4 , it is the case where the current regulator circuit 49 of an absorption mold is connected, instead of the resistor 415 of the output side of diode 411. Therefore, since according to this example that bias current is fixed even if the forward drop electrical potential difference of diode 411 changes with temperature, the envelope detection electrical potential difference V13 becomes stability further to a temperature change.
[0027]
[Effect of the Invention] Since it has canceled with the offset voltage V43 which took out the offset voltage V415 of the detection electrical potential difference V41 by the sampling hold circuit 43 even if the diode 411 for detection is influenced of temperature, the envelope detection electrical potential difference V13 which does not change with temperature can be obtained.
[0028] Moreover, since the envelope detection electrical potential difference V13 is not influenced of temperature, it can also use the trunk room of the large automobile of a temperature change. Furthermore, since temperature compensation will be carried out for every time in front of the transmitting time slot T, a rapid temperature change can also be followed and the envelope detection electrical potential difference V13 can be obtained to stability. And since offset voltage is not contained in the envelope detection electrical potential difference V13, the envelope is detectable even if a sending signal S13 is minute level.

[Translation done.]